Nov 30th, 12:00 AM

Delivering Continuing Education to AG Professionals - The Crop Adviser Institute (www.cai.iastate.edu)

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Abstract

Continuing education is essential for agricultural professionals, whether required by a certifying organization or completed voluntarily as a supplemental educational opportunity. Agricultural continuing education has traditionally been delivered on-site, but temporal, geographical, and other constraints often prevent individuals from attending these courses. The Crop Adviser Institute (CAI) has been established to provide an alternative method of delivering continuing education. Implementation of forward-thinking pedagogy and utilization of current technologies led to development of the CAI program which focuses on creation of high-quality, interactive learning modules designed to be delivered at a distance via CD-ROM. Preliminary evaluation of this program has shown that this is indeed a viable delivery method for this specific content to the target audience of certified agricultural professionals.

Introduction

The need for continued and advanced training for agricultural professionals is increasingly essential as the development of new technologies accelerates, and information is produced in increasingly large quantities. Additionally, many professional organizations confer certification credentials upon individuals who have met performance benchmarks through completion of training programs and/or examinations. Following certification, these individuals are often required to complete a specified number of continuing education units (CEUs) within a certification cycle or other specified time period. These CEUs are generally available through traditional on-site courses, or through off-site courses including print-based media or computer-assisted learning materials. Traits associated with each of these delivery methods are illustrated in table 1.

This variety in available CEU opportunities, and the treatment of each delivery method by professional certification organizations, leads to the ongoing debate over the inequities which have long been perceived regarding the quality of educational outcomes as attributed to instructional method and mode of delivery. Clark (1983, 1994a, 1994b) has stated that the delivery media used has no bearing on learning outcomes; it is the instructional method alone that produces variation in outcomes. Clark (1983) states in his delivery truck analogy that it is not the vehicle but the contents of the vehicle that are important, so delivery media is important

only in providing the most efficient and economical vehicle to deliver information. It is this economy aspect which has increased the number of off-site CEU opportunities available to the agricultural profession. Temporal, geographical, and fiscal constraints imposed upon learners have diswayed them from on-site learning opportunities, and now they often choose between off-site delivery alternatives instead. Clark (1994a) states in his *claim of replaceability* that any content can be delivered by at least two types of media, and that we must choose the most economical of these when designing programs and courses. Clark (1994a) also admits that one of the economy aspects that must be evaluated when designing a course is *cognitive efficiency*. This statement seemingly supports choosing one media over another when a course has time constraints involved and requires delivery of the maximum intellectual value possible within a limited amount of time.

The theoretical framework upon which the Crop Adviser Institute is based is one put forth by Kozma (1991). He states that learning is an active process where a learner extracts information from the learning environment, including both internal and external components, and constructs it into new knowledge using available cognitive resources. The ability of a delivery media to supply information and fuel learner cognitive efforts in a way that the learner would not normally act on their own enhances the ability of the learner to transfer these skills to new situations (Kozma, 1991). The CAI attempts to build on this by presenting challenging material in a manner which helps the learner combine their knowledge base with the new material, synthesize it, and apply it to new situations. Cobb (1997) states that cognitive efficiency is an attribute which can connect media and learning by increasing the efficiency with which learning is accomplished. Different media types may be more efficient in delivering certain types of content, and/or delivering materials to a certain type of learner. We would agree with Cobb and state that because of these efficiencies, computer-assisted learning has a definite advantage over other delivery methods. Computer-assisted courses often offer an increased pool of instructional tools and techniques including: interactive practice exercises, audio and video tutorials, enhanced graphics, and the capacity for large reference sections. Clark (1983) even alludes to these efficiencies when he says that if the same effort and enhancements invested in new computer-assisted courses were focused on conventional classroom learning, the outcomes of classroom courses would not lag behind the enhanced computer-assisted courses. Again, we would argue that it is not only the effort that is placed into creating the enhancements, but also the vehicle (the delivery method) that allows for these enhancements. Pedagogical elements of CAI modules, including interactive exercises, are included to increase these cognitive efficiencies and enhance positive learner outcomes.

The primary objective of our preliminary course module evaluations were to determine whether computer-assisted learning would be accepted by agricultural professionals as a method of obtaining continuing education, and to gain information on how the modules may be improved to better facilitate the educational process.

Materials and Methods

This pilot study was conducted over two time periods. The first period was during January, 2002 with the course module *Growing Degree Days*, and the second was during April, 2002 with the

module *Diseases of Crops – Basis and Definitions*. Content for these two agricultural continuing education modules were developed by instructors who possessed both subject matter and instructional expertise.

Participants

Participants learned of this opportunity through professional presentations conducted by the CAI and through advertisements on the CAI website (**www.cai.iastate.edu**). One hundred agricultural professionals signed up on-line and offered to participate in one of the two study periods. Participants were required to hold a valid certified crop adviser (CCA) certification as governed by the American Society of Agronomy, and received two CEUs following their participation in the study. Course materials were provided at no cost to the participant. Participants were assumed to have a minimum base level of agricultural knowledge determined by their demonstrated ability to pass two rigorous certification exams in order to obtain their CCA certification credentials.

Procedure

Course material was on CD-ROM media and was displayed using the participant's computer. Courseware/software installation instructions were included with the material. Users were not required to be on-line while completing the material. Materials were completed off-site and no instructor interaction was available, but interactive elements of the courseware are designed to supply feedback and reinforcement as the user completes the module. The courseware also contained additional reference materials for supplemental learning not required to meet the learning objectives identified for the course module. Note taking was allowed and notes could be used when completing the final exam for CEU credit. The final examination and evaluation instrument were on-line, residing on the CAI Internet web-server. The exam and evaluation were accessed by clicking on an icon at the end of the learning module which would direct the user's computer browser to the appropriate testing site. Participants were instructed to complete the exam and evaluation within one month of receipt of the materials. Users completed the evaluation instrument using a web-based form consisting of radio buttons to indicate their choices for quantitative portions, and qualitative portions of the evaluation required the user to type a text response.

Results and Discussion

Course materials were completed (including final exam and evaluation) by 52% of those who received materials. Participants reported that although 66% had completed an off-site course of any type in the past, only 41% had completed any form of electronic CEU materials. The limited experience of participants with the electronic format is an indication of the lack of CEU materials currently available in this format. The majority of electronic materials currently available are simply text documents presented electronically, and lack any user interactions beyond reading the text. This lack of accessibility to quality off-site CEU materials is one reason that CAI course modules are being developed.

Demographics

The evaluation group was primarily male, over age 35, and most had post-secondary education (Table 2). Certifying organizations require participants to have a minimum combination of experience and education to be eligible for certification and since this was a certified group these results were similar to what was expected. A majority of the participants (84.5%) participated from a location over 50 miles from the study site in Ames, IA. A positive element that the study group reported was that they liked not having to spend time and money traveling to an on-site course, affirming the CAI program's application of Clark's (1994a) choice of delivery method as determined by economics.

Learning approach and outcomes

Study participants felt that they benefited from the graphics and interactive elements presented in the learning material (Table 3). These interactive elements and supporting reports reinforce the application of Clark's (1994a) cognitive efficiency theory, increasing the intellectual value of these course modules. Study participants reported that the integrated self-test was a good way to prepare them for the final CEU examination. Many comments from participants were akin to this one, "The sample test and interactive portions helped me make sure I was focusing on the most important parts of the material, and that I was understanding it correctly." They felt content was presented in a clear and concise fashion, and that the difficulty level of the material was appropriate. Sequencing the course material in a logical order, and building larger concepts from smaller pieces are strengths of these modules. One of the main goals of the CAI program is to provide material that is educational and directly applicable for the learner. Participants overwhelmingly reported that the material they learned was directly relevant to their professional work. The lack of experience with electronic courses did not disway the participants from completing the materials as user confidence in operating their computer system and the course software was reported as very high. Learner achievement as measured by scores on the final CEU examination was found to be 85.1% (std. dev.=13.2), illustrating that the main points of the material were mastered by the participants.

Summary

Results of this pilot study indicate that electronic learning materials are practical and will be utilized by the target audience. Perhaps the greatest indication that this method is indeed a viable delivery method for this audience was that 99% of the participants reported that based upon their experience with the CAI course module they completed, they would complete another electronic module. This was reinforced through comments made by participants such as, "I liked the cost structure and ability to work into my schedule instead of the provider's schedule. The ability to choose topics of interest are also important to me." Reductions in travel time, overall cost, and ability to fit completion of the CEU course into the user's schedule were reported by many participants. The opportunity to complete the course in discontinuous time periods and the capability for unlimited review of the materials were also cited as benefits of this program. Based on the information gathered by this study, production of new course modules is continuing and further evaluation data is being gathered.

Author note

For more information on the Crop Adviser Institute please visit www.cai.istate.edu, e-mail cai@iastate.edu, or telephone (515)294-7546.

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Table1. Traits associated with continuing education in agricultural professions.

Delivery style	Delivery location	Delivery methods
On-site lecture	Place-bound	Verbal lecture Projected text and graphics Instructor interaction Content contact time limited
Off-site print-based	Unrestricted	Printed text and graphics No instructor interaction Unlimited content contact time
Off-site computer-assisted	Unrestricted	Computer displayed text/graphics No instructor interaction Computer interactive simulations Automated feedback/reinforcement Unlimited content contact time

Table 2. Demographics of evaluation participants. (n=104)

Category		%
Gender	Male	97.0
	Female	3.0
Age	< 24	2.9
	25-34	17.5
	35-44	30.1
	45-54	42.7
	> 54	6.8
Education	High School	19.2
	Associates Degree	7.7
	Bachelors Degree	58.7
	Masters Degree	9.6
	Ph.D.	4.8

Table 3. Distribution of learning approach and outcome responses. (n=104)

Question	% responses SD	D	N	A	SA
Learner benefited from graphics and interactive elements	0.0	2.9	3.9	40.8	52.4
Self-test was a good preparation tool for final exam	1.9	1.0	1.9	47.1	48.1
Course material was presented clearly and concisely	1.9	6.8	8.7	53.4	29.1
Difficulty level of material was appropriate	0.0	2.9	13.5	68.3	15.4
Material learned was directly applicable to work	0.0	4.8	11.5	58.7	25.0
Confidence in operating computer and software	0.0	3.8	2.9	46.2	47.1

SD= Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree